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**USAID Montenegro
Good Local Governance Project**

**DIAGNOSTIC
ASSESSMENT OF
MONTENEGRIN WATER
AND SEWAGE WORKS**

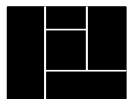


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DIAGNOSTIC ASSESSMENT OF MONTENEGRIN WATER AND SEWERAGE WORKS

1. INTRODUCTION

Good Local Governance (GLG) Component 3 (Municipal Services Improvement) staff conducted an Initial Assessment of all 21 Montenegrin water and sewerage public companies (water works) from December 2003 to March 2004. The staff of each company was asked a series of 40 questions, which were divided into five general categories, as delineated below. The intent of the survey was to document existing conditions at the Montenegrin water works, summarize trends, and identify needs.

In the sections that follow, each question is included with a summary of the salient features of the responses received from the Montenegrin water works. Appendix A is the complete database of the results of the Montenegrin Water and Sewerage Company Diagnostic survey.

2. GENERAL DATA

1. *Specify the type of ownership of the company that performs water supply and sewerage services.*

All Montenegrin water and sewerage works are publicly-owned companies. They are established by the Municipal Assembly by "The Decision on Foundation of Public Company - *Name of City*" or "The Decision on Foundation of Public Utility - *Name of City*".

2. *If the company is publicly-owned (municipal ownership), please specify the following: Does the company operate as a Public Municipal Services Company in charge of water and sewerage services only or does it also perform other municipal services? Please specify the additional services.*

Out of 21 municipalities, 11 municipalities have public utility companies that only provide water and sewerage services (VIKs - Vodovod i Kanalizacija). In the remaining 10 municipalities, water, sewerage and other municipal services are provided by a general Public Communal Service Company (JKP).

- 2a. *In some municipalities, are water and sewerage services provided by a local government department or other water and sewerage authority? (e.g., are some services fully or partly provided by the Secretariat for Communal Services)? Describe.*

No municipality operates its water and sewerage services as a department of local government.

In the majority of municipalities (86%), one public municipal services company (either the VIK or department of the JKP) provides all water-related municipal services: water supply, sewerage, and storm water drainage. However, in some municipalities (Berane, Cetinje and Herceg-Novi), a different general public municipal services company performs maintenance of the storm water drainage system. Most municipalities have a

number of public municipal services companies that together perform all municipal service functions.¹

Unlike many older western cities, sewer and storm water systems in Montenegro were originally designed to operate as separate systems. Storm water collection and drainage is mostly via surface drain channels. Cleaning of these surface storm water drainage channels is usually the responsibility of the public municipal services company that is responsible for public areas cleaning.

In Pljevlja, the public heating service is operated by its VIK. Pljevlja has the only public heating system in Montenegro, functioning as a group of separate boiler houses for one or several buildings (there is no main distribution pipeline or central boiler).

3. *If the company is privately or public-privately-owned or operated, provide a detailed description.*

At two water works, some initial attempts have been made to engage private companies in water service activities, as noted below.

Herceg Novi (HN) – Between 1998 and 2001, the Government of Montenegro, contracted private companies "Hidromont-Merkur" and "Igalo-Promet" (without consent of HN VIK) to further investigate the viability of water sources "Podkop-Mojdež" and "Lovac-Mojdež". The assessment of these sources was performed earlier by HN VIK. The private study yielded no additional useful information and reportedly caused some damage. Currently, the situation regarding new water sources for HN VIK remains complicated.

Tivat – A part of the Tivat distribution network (which is physically separated from the rest of the network) is operated by the private company Hidromont-Merkur. Hidromont-Merkur's contract with the Government of Montenegro (GoM) specifies that it will provide operation and maintenance (O&M) and payment collection services for a period of 10 years (contract ends 2008). GoM has given a concession to the same enterprise for using the underground water coming from Toplis aquifer spring, which is situated in the territory of Kotor.

4. *Describe all municipal services operated by this company (e.g., water supply, sewerage, storm water management). Are these services (and which ones) provided by the same department or by separate departments of the company?*

The first part of the question is explained above in the response to question 2a.

Montenegrin water/sewerage works vary greatly. Depending on the municipality, the water/sewerage works may be structured according to technical sectors, services and/or other departments. Occasionally, the management system is structured in two, three, or more levels of management.

Generally, a water/sewerage works usually has three levels of management:

- engineering service/sector
- financial service/sector

¹ Eleven municipal services are noted in the Law on Utility Services (12/95): water; sewerage; storm water; district heating; public transportation; sanitation; park maintenance; street maintenance; communication trenches; public areas; public lighting; as well as construction and maintenance of local roads; construction and maintenance of landfills; construction, maintenance and utilization of bridges and riverbeds; cemeteries maintenance; chimney sweep services; and service provision and maintenance of: public toilets, dog pounds, public parking lots, and green markets.

- general affairs service/sector

Usually, at JKPs (those general public companies that provide other municipal services in addition to water/sewerage services, as described above), the water/sewerage operation and maintenance functions are often performed within one service/sector of the JKP. Other water/sewerage-related services (e.g., billing and collection) may be performed by another sector of the JKP, which combines similar functions for other municipal services provided by the JKP (e.g., public areas cleaning, garbage collection, public green area maintenance).

The engineering service/sector at a water/sewerage works usually has three sub-departments:

- water works
- sewer works (may include storm water management)
- machinery

But when the municipality has a poorly developed sewer system, there usually is no separate organizational unit in charge of sewer works. In this case, sewer O&M is performed by the water works employees as needed.

5. *Please provide the name of the Mayor of the municipality and General Director of the VIK or JKP. Provide contact address and telephone numbers of the City Hall and the VIK or JKP.*

A list of contacts is included in Appendix 1.

6. *Please provide a short history of your water system. When was it constructed/established? When and what were major upgrades/extensions, reconstructions, and/or capital repairs? Are there any technical/balance problems in the existing water system that are a direct consequence of these reconstructions?*

Organized water supply in Montenegro began at the end of the 19th century. The oldest water works – Cetinje Water Works - was founded in 1891. By the beginning of the 20th century, three more water works were developed in Danilovgrad, Herceg-Novi, and Tivat. By World War II, Montenegro already had nine municipal water works. By 1970, water works were established in all municipalities except Plužine (commenced 1974).

The most extensive water supply systems development corresponds with the period of general social development in Montenegro (1960-1980). Unfortunately, some of the upgrades and expansions planned during this period remain incomplete today. Overall, Montenegrin water supply systems lack reservoir space. However, distribution systems are sufficiently developed, usually covering the entire urban space of municipality centers.

The latest “trend” in water supply system upgrades is the complete replacement of selected water mains, to the extent that the water works has access to outside investment capital (e.g., most replacements projects are financed by donor grants, accompanied by a small municipal budget contribution).

While western water works are intensively monitored and recent upgrades strive to optimize system operation and maintenance (e.g., remote-controlled measuring, supervision and automated; new technologies for repairing distribution network breakdowns; power consumption minimum), these upgrades have not been implemented to date in Montenegrin water works. Technically, water works operations in Montenegro

are very similar to those of the early 1970's in the West.

3. TECHNICAL DATA

7. *Describe the water source (e.g., reservoirs, rivers, wells, natural springs) and their nominal capacity (l/s) by source. Specify and describe any problems with the raw water quality (e.g., turbidity, hardness, chemicals) that periodically or permanently exceed the limits.*

All Montenegrin water works are supplied from natural sources. At 12 water works (67%), water is from natural springs. Water from natural springs is not treated, except for chlorination. Water reaches the consumers in its natural form.

Thanks to mostly uninhabited or minimally-inhabited recharge areas and geological features, water is continuously chemically and microbiologically safe for drinking (assuming chlorination). Occasionally, there is an increase in water hardness. After heavy rainfall, turbidity (due to increased minerals) increases in the majority of water sources.

In case of two coastal water/sewerage works, Tivat and Kotor, saline water is detected during summer months because their water sources are at or just above sea level.

At seven water works, the water source consists of wells combined with natural springs. Usage of well water solely for water supply is limited because large capacity aquifers are few (some large capacity aquifers are located near Podgorica and Ulcinj).

Only two water/sewerage works, Herceg-Novi and Pljevlja, use water from man-made reservoirs for their water supply. Although both water supply systems include water treatment facilities, the quality of the raw (untreated) lake water in both cases (according to Department of Health reports), meets Montenegrin standards for manganese and iron, and usually for fecal coliforms.

8. *Specify the total capacity of the water system.*

Due to the lack of water flow meters at most Montenegrin water sources, the accuracy of available data below must be presented with reservations.

- a) *Is the quantity of water available to consumers always over maximum daily consumption (l/s)?*

Eleven water/sewerage works (52%) reported that they always deliver enough water for all water needs of their customers, though the remaining 10 water works (48%) indicate that they experience summer water shortages (Nikšić, Bar, Kotor, Herceg-Novi, Budva, Berane, Bijelo Polje, Pljevlja, Cetinje and Tivat). Unexpectedly, not all water works experiencing summer water shortages are situated along the coast. Five of them are in central or northern Montenegro.

- b) *What is the average total capacity of water source(s) (l/s).*

Flow meters are used to measure water production only exist at two water/sewerage works (Podgorica and Herceg-Novi). In 12 water works, water production is staff-assessed. At seven water works, no estimate of water production is made. At these companies, water production is estimated from project documentation.

The assessed water production from all Montenegrin water works is about 6400 l/s;

25% is produced by Podgorica VIK, putting it in a class by itself.

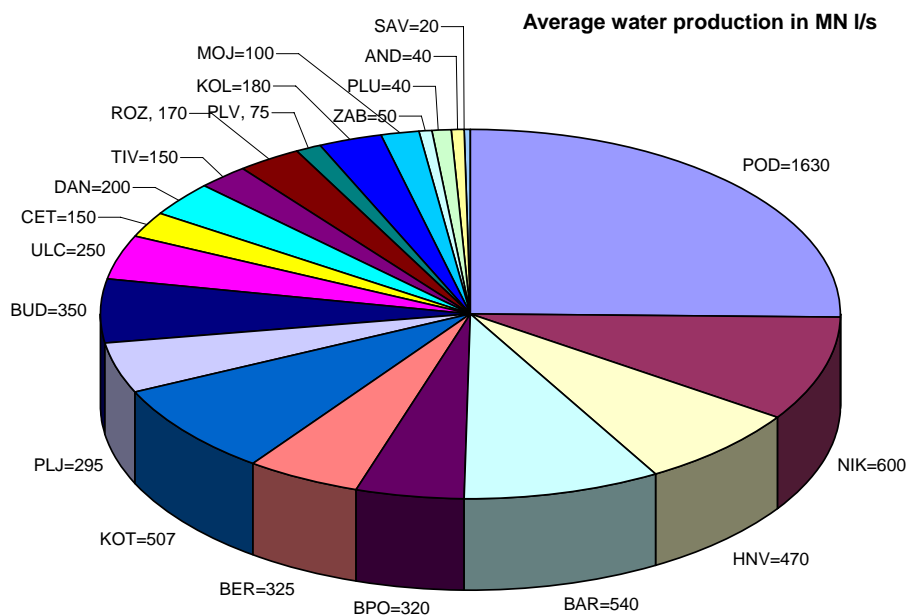


Diagram 1 – Average water production in MN l/s

Other Montenegrin water works can be divided into three groups:

- Large (8) – water production 600-300 l/s:
Nikšić, Bar, Kotor, Herceg-Nov, Budva, Berane, Bijelo Polje and Pljevlja (all VIKs)
- Medium (6) – water production 300-100 l/s:
Ulcinj, Danilovgrad, Kolašin, Rožaje, Cetinje (VIK), and Tivat (VIK)
- Small (6) – water production under 100 l/s:
Mojkovac, Plav, Plužine, Andrijevica, Žabljak and Šavnik (all general communal companies - JKPs)

It is notable that all water/sewerage works reporting water supply problems are organized as VIKs (independent water and sewerage companies), while those reporting no supply issues are part of a JKP. However, most VIKs were formed because their operations were too complex (e.g., the VIK was very large or experiencing water shortages) to remain part of a general JKP.

c) *If it exists, please specify the design and operational capacity of the water treatment plant (l/s). Also, briefly describe the water treatment process.*

Only the two water supply systems that use reservoirs as their water source (Herceg-Nov, 600 l/s and Pljevlja – 210 l/s) have water treatment facilities. Since their raw water quality is good, both treatment facilities use simple technology consisting of primary settling and filtration through rapid sand filters, with final chlorine gas disinfection.

In all other water works, water treatment is limited to chlorination, mostly (90%) with chlorine gas. Liquid chlorine solutions are used only in the water systems of Mojkovac and Šavnik.

d) *Specify the number of water tanks and total tank storage (m³).*

The number of water reservoirs in Montenegro is generally small. Bijelo Polje has no reservoir, though there is at least one reservoir at each of the other water works. Often, reservoirs were added when two pressure zones were needed because the change in elevation covered by the distribution network caused excessive water pressure within the system.

The water system of Herceg-Novi has the largest number of reservoirs – 19.

Whether individual water systems have sufficient reservoir capacity to balance uneven water consumption from one hour to the next is difficult to evaluate because information on hourly water consumption is unavailable. However, by monitoring the relationship between reservoir tank volume and total daily consumption volume, the following conclusions can be drawn:

- Cetinje (100%) and Tivat (41%) have sufficient reservoir capacity.
- Total reservoir capacity of all the large water works (excluding Berane and Bijelo Polje) equals 10-30% of daily volume, which is usually satisfactory.
- The remaining 11 water supply systems have inadequate reservoir capacity, which causes problems in water distribution.

e) *Specify the total length of mains and distribution pipelines DN ≥ 150 mm (km).*

f) *Specify the total length of the rest of the distribution network (km).*

Montenegro has approximately 4600 km of water supply pipelines. Mains and distribution pipelines equaling DN 150 in diameter or greater make up 30%, while the remaining 70% of pipeline has smaller diameters.

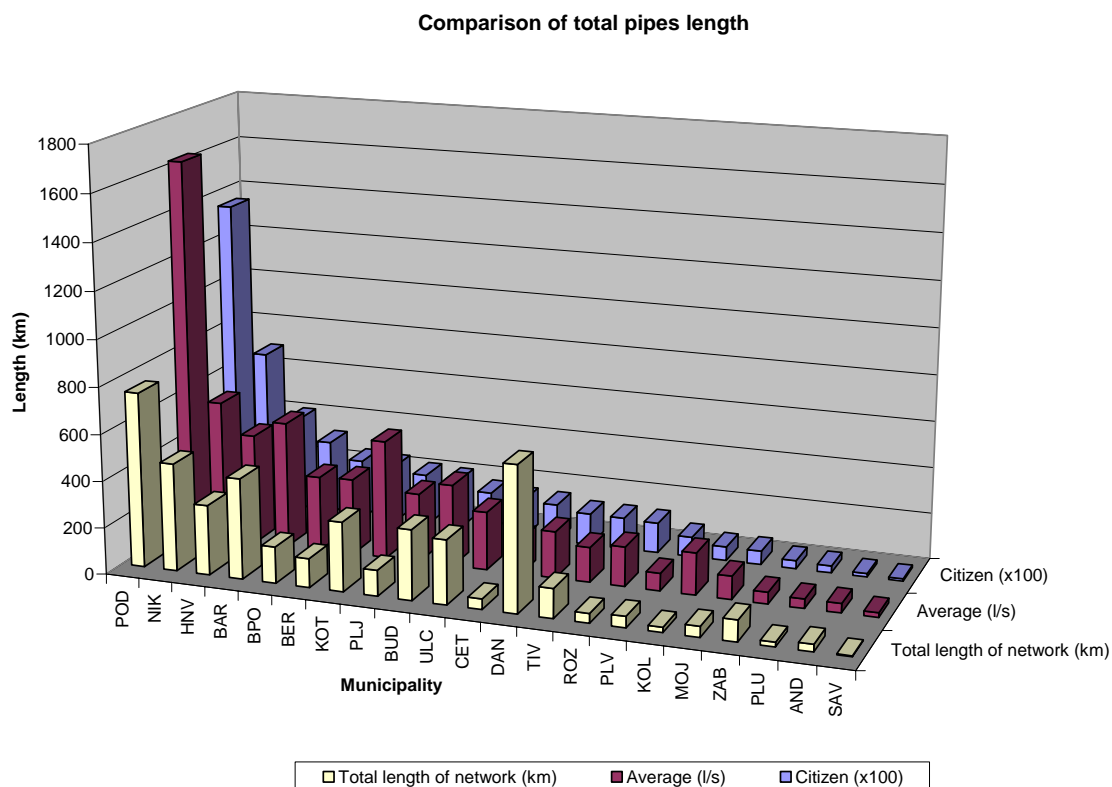


Diagram 2 – Comparison of total pipe length

Diagram 2 shows data on number of inhabitants, average annual system capacity in l/s, and total length of water lines. The data indicate that water supply networks are well-developed in Bar, Kotor, Budva, Ulcinj, and particularly in Cetinje and Danilovgrad; and undeveloped in Bijelo Polje, Berane, and Pljevlja. The undeveloped water supply networks are very short and concentrated in one area of the municipality, compared to the number of inhabitants.

Further analysis of the five most developed water supply networks, reveal that the developed networks have a significant percentage of the network with pipe diameters greater or equal to DN 150. These networks should have sufficient delivery capacity. Water Works Danilovgrad is an exception because it supplies water to numerous villages around Bjelopavlici using a small diameter network, but does so without any major problems.

9. *Specify the type and frequency of water sampling. Is it conducted pursuant to Law? Are there any water quality problems at the plant (after chlorination or after treatment) or at the tap? Please comment, as necessary.*

Water quality in all public Montenegrin water systems is tested by the Institute for Public Health Protection of the Republic, as required by regulations recorded in the Book of Rules on Quality of Natural Water. Water sampling, according to the regulations, is performed at least once a month (more often in larger water works). Only in Šavnik is there no regular water testing, mostly due to unsettled debts owed to the Institute for analyses already performed.

10. *Please provide short comments related to the technological level of your water supply*

system. Indicate areas in need of improvement.

A list of comments is included in Appendix 1. Due to the variety of water supply systems in Montenegro, specific comments vary for each water system.

11. *What is the total number of inhabitants connected to the municipal distribution network? Please also state % of inhabitants (relative to the total population) that are connected to the network.*

The number of inhabitants per water supply system is shown in Appendix 1. Generally, all inhabitants who have physical access to the water supply network (the water supply network exists in their streets) are connected to the water supply system.

While almost all inhabitants are connected to the water supply system, not all are legally registered as customers. The reasons and percentage of illegal connections differ throughout Montenegro.

12. *Please specify for the end of 2001:*

Total number of connections

Number of house connections

Number of institutional connections

Number of business connections

Although this data was collected from all water works, possibly the response from Budva stating that “no such number could be established” is the most accurate response.

In Montenegro, an accurate estimate of connections requires that they be physically counted, because there are both legal and illegal connections. Water works often require that all connections be metered to be strictly considered legal, but over the years, these rules have been relaxed. Currently, many water works have flat rate customers (customers pay a flat rate for their water based on inhabitation area or number of occupants). Also, many connections granted between 1992 and 1995 to buildings inhabited by refugees still do not have water meters.

Additionally, one water meter does not necessarily represent one connection and/or one bill. Often, several structures with different owners are connected to one water meter. Usually in this case, the water authority will issue a separate bill for each structure or residential unit. If part of the building(s) are used for business purposes, the situation is complicated further.

Sometimes, additional water meters are officially installed (after the primary water meter) for metering water consumption of a different price category (e.g., business customers, such as for a car wash service). The water bill will then report water use for business purposes and this amount will be deducted from the primary water meter reading. Alternatively, business water consumption might be calculated as a lump sum (e.g., m³ used per month) or calculated as a percentage of the total consumption measured by the primary water meter.

A similar situation exists in residential buildings where there is only one meter and the total water bill must be equitably divided according to water use by each household. Usually, the bill per residential unit is calculated based on the number of household members. However, this approach is not practical along the coast where residential

units are used only in summer. In some units, check water meters have been installed by customers, who often have to pressure water authorities to recognize their validity. In residential buildings where customers have been successful in getting the water authority to recognize check water meter readings, the difference between total water consumption measured by the primary water meter and that measured by all check water meters (installed in each residential unit) is paid by the water works.

Complex metering situations also occur in shopping malls or privatized business premises located in former public companies, but currently owned by different owners.

Billing problems are also caused by poorly organized and managed customer records. Often, there are no uniform procedures for standard customer services, such as connection requests and installation, or permit issuing. Also, maintenance of the customer database and data entry of the meter reading service logs is inadequate. The fact that a number of water works do not keep computerized records is not the most significant problem at this time.

13. *Please specify the 10 biggest consumers, stating their monthly consumption (m³/month). Is this consumption seasonal?*

Large consumers for each water supply systems are listed in Appendix 1 to this report.

14. *Please specify the number of days per year your system has inadequate water pressure. How many customers have low pressure? Please specify the number of days per year where some customers are without water supply (including night).*

In order to more accurately assess the responses to this question, a rating scale was developed:

Category 1 - Never have low pressure

Category 2 - Low pressure only during summer (including only part of the system)

Category 3 - Low pressure all year (including only part of the system)

Category 4 - General water use restrictions in the entire system year round

Only three (14%) of the water works (Andrijevisa, Mojkovac, and Rožaje) assessed their water supply as adequate throughout the year (Category 1).

The majority of water works (67% or 14 water works), experience problems in water supply mostly in higher elevation zones only in summer, due to lack of equalization tanks that would balance periods of peak consumption (Category 2).

Water Works (Kotor and Tivat) (10%) experience water balancing problems year-round (Category 3).

Two (10%) water works have year round water balance problems (Category 4) and a long history of daily water service interruptions. These water works are Cetinje and to some extent Plav (Plav seldom experiences water service interruptions in the winter).

4. MANAGEMENT STRUCTURE AND PRACTICES

The following section outlines general conclusions regarding water works management.

15. *Provide a full organizational chart of your VIK or department within the JKP that is in charge of water supply and sewerage services. At JKPs, provide information regarding sharing of resources between your water/sewerage activities and other JKP departments. Describe how your VIK or JKP is linked with the local government.*

Organizational structure has already been discussed in question no. 4.

Management structure in all VIKs or water/sewerage sections of JKPs consists of a General Director, Board of Directors, and Supervisory Board, which complies with the Law on Public Utilities (1991).

In each Municipality, the Municipal Assembly appoints the Board of Directors (3,5 or 7 members) and the Supervisory Board (3 members). The majority of members of these Boards (2,3 or 5 members, or 2 members) come from local political parties – usually only those in power. Other members are employees of the company, usually proposed by the Trade Union. Members of the Board of Directors coming from local parties are usually underqualified for making decisions on important issues of operation and development of a water supply enterprise.

Among the local self-government bodies, the Secretariat for Communal Affairs or, in smaller municipalities, the Secretariat for Economy, is in charge of operation supervision and communication. This body gives formal consent to decisions made by the Board of Directors. Pursuant to the Statute of the enterprise, the Board of Directors must also obtain consent for decision-making from the local authorities (founders).

However, final consent for decisions, whether scheduled for voting in the Municipal Assembly session or not, is given by the Mayor.

16. *What is the total number of the employees in your VIK (or in some departments of JKP for water and sewerage services)? Please include the number of employees working in key positions (e.g., management, water works engineers, sewerage engineers, billing and collections, accounting) and their educational background.*

Considering numbers of key staff, there are important differences between public communal companies specializing only in water and sewer works operations (VIK) and general public communal companies (JKP).

For JKPs, it is not possible to specify an exact number of employees working in water and sewerage services because some parts of the company (e.g., billing, accounting, machinery, warehouse, even physical labor force, if needed) act as a resource for all communal services provided by the JKP.

For comparison purposes, specialized VIK employees were taken out of the data for Diagram 3 presented below.

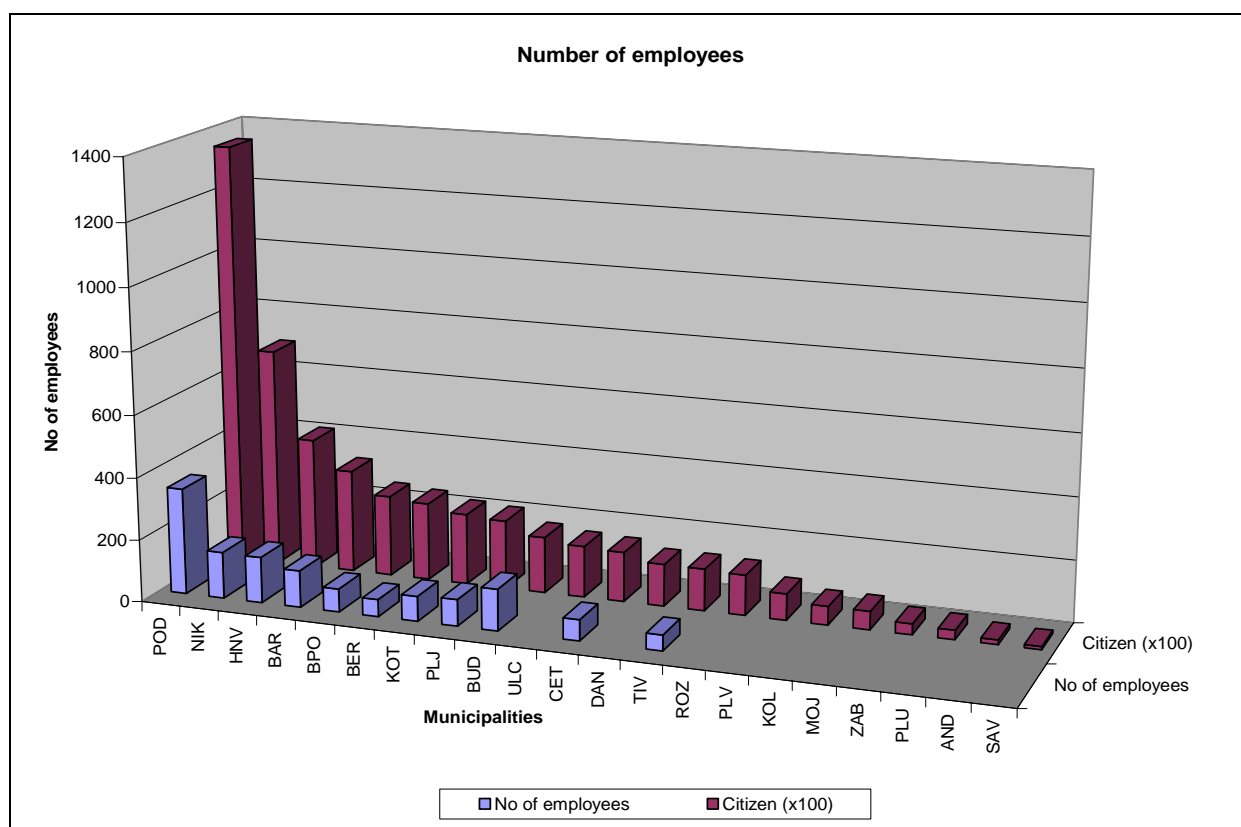


Diagram 3 – Number of employees

If the number of employees per 1000 inhabitants is taken as a benchmark, Montenegrin water works usually report between 2.5 and 3.5 employees/1000 inhabitants. Nikšić (2.1) and Berane (2.2) report the fewest employees per 1000 inhabitants, while Budva has the largest staff (7.4 employees/1000 inhabitants).

Considering the number of employees per 1 km of water supply network as a benchmark, Montenegrin water works usually report between 0.4 to 0.5 employees/1 km of water supply network. Nikšić, Bar and Kotor have the fewest employees per 1 km of water supply network (0.3), while Pljevlja at 0.8 employees/km network and Cetinje at 1.5 employees/km network are above average.

Most water works lack technical staff, which is not particularly surprising since there is a limited supply of skilled persons in Montenegro and wages and working conditions at most water works are not as favorable as other available employment options. For example, even in former State civil engineering companies, skilled engineers will have better working conditions and earn several times more than in communal services. Other skilled disciplines and administrative staff are well-represented at CG Water Works (e.g., economists, lawyers, accountants).

Except in Podgorica and Bar, there are no water engineers on staff and few highly qualified plumbers. Generally, the Technical Director of the water works is either a mechanical, mining engineer or civil engineering technician with extensive practical experience. More recently, IT specialists are becoming Technical Directors.

17. *Investments: describe any recent major upgrades or investments implemented (this year); planned upgrades still not implemented; and upgrades planned for the next 3 years.*

A list of comments is included in Annex 1 to this report. Due to variety of water supply

systems, comments on each water system are specific.

In Montenegro, investing in water supply and sewer works improvements is not controlled by the enterprises providing those services, but rather is included as part of the Municipal Budget. Water supply enterprises can only include proposed upgrades in their annual plan, and submit that request to the Municipal authorities for inclusion in the Municipal Budget. Implementation of upgrades is then dependent on whether sufficient revenues are collected to cover the proposed expense. In some cases, the Board of Directors of water supply companies does not even select the contractor hired to perform the upgrade or construction; but rather, once the Municipality has completed the project, it is turned over to the water works for maintenance. This in turn, occasionally causes problems because of a lack of coordination to satisfy minimum technical and quality standards.

The general conclusion is that for the last 10 to 15 years, the Municipal authorities have been following these procedures and only very limited investments have been made to the water systems. Thus, it is no surprise that there is a general state of gradual deterioration of Montenegro's water supply systems.

Exceptions are Bar, Cetinje, Budva, Tivat and Herceg-Novi, which made the following recent investments using Municipal funds: Bar (344.000 EUR), Budva (300 m. of pipeline and 5 pumps in 2003), Cetinje (200 m. of pipeline and pumps), Herceg-Novi (1100 m. of pipeline) and Tivat (70.000 EUR).

In municipalities where international donors have been the main financiers, the following improvements have been made over the last 3 years:

- Danilovgrad – expansion of network (120.000 CHF, 100.000 Government of Montenegro, 30.000 the Municipality)
- Mojkovac – construction of new main water supply channel to the town (9 km, DN 250), donated by the Dutch Government.
- Plav – replacement of the main water supply channel to the town (4 km of pipeline), donated by EAR
- Šavnik – PS construction works completion, donated by CHF

18. *What is the balance between the current total of bills issued but not collected (only for water supply and sewer services) compared to a total of bills issued to customers during one month?*

Answers to the above question (except for Pljevlja and Plav) are graphically shown in diagram 4, where the y axis is in months:

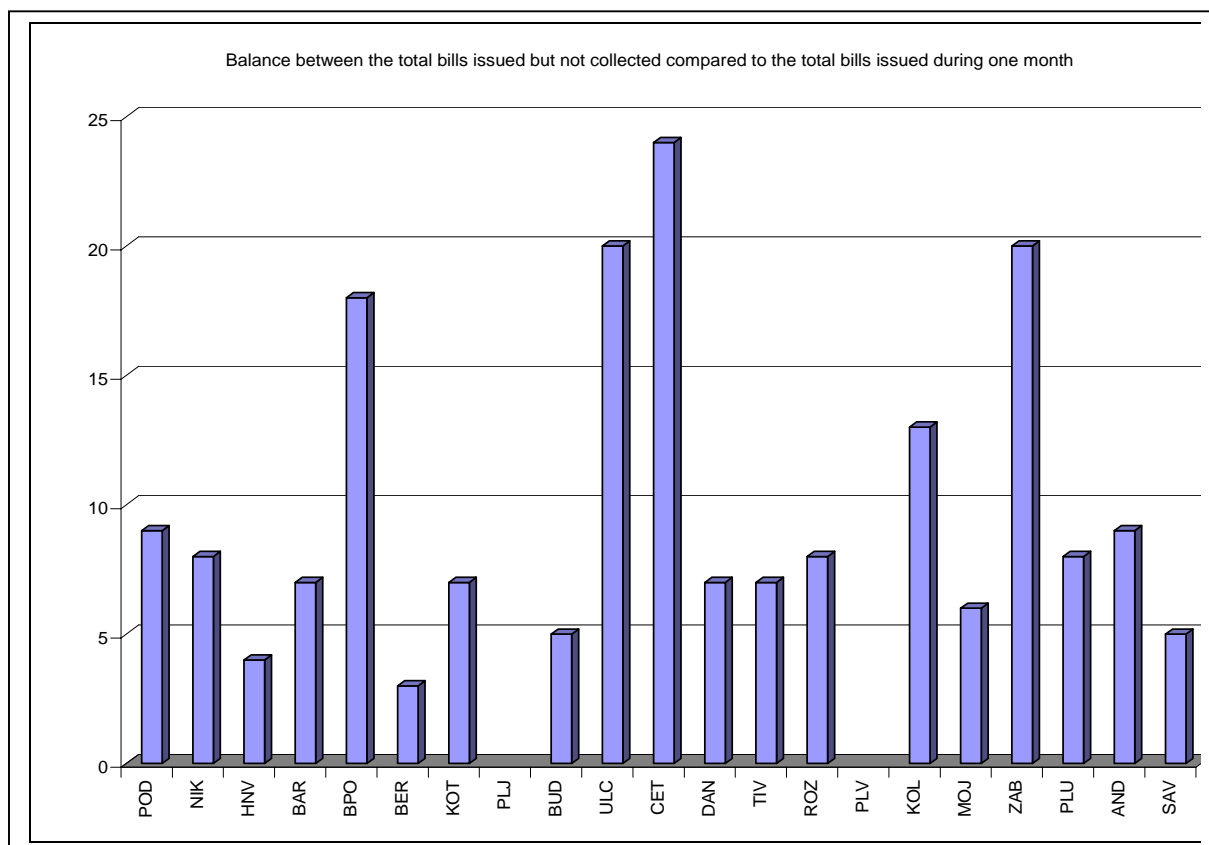


Diagram 4 – Delayed Bill Payment in Months

It is clear that five water supply enterprises are in a very critical financial situation (Cetinje, Ulcinj, Žabljak, Bijelo Polje and Kolasin).

Most of the water works in Montenegro have average debts of 5-10 monthly billing cycles. This lack of income certainly threatens daily operations, but not to the extent that future water delivery is in question. The water works are able to pay basic expenses such as chlorine, fuel, and payroll. In addition, electricity bills are covered through compensation deals or a non-balance settlement with GoM. However, this precarious financial position does not allow for any preventive maintenance, parts inventory for damage repair, vehicle and machinery maintenance, water meter servicing, etc. Over time, this inability to be proactive in preventing breakdowns leads to more expensive and unpredictable costs.

According to the above criteria, only 2 out of 21 water supply enterprises, are in a slightly more favorable financial position (Berane and Herceg-Novi).

Considering monthly billed water, total revenues of all Montenegrin Water Works should be to slightly under 2.000.000 EUR/month, if all receivables were collected.

Diagram 5 shows the monthly billings for each water works:

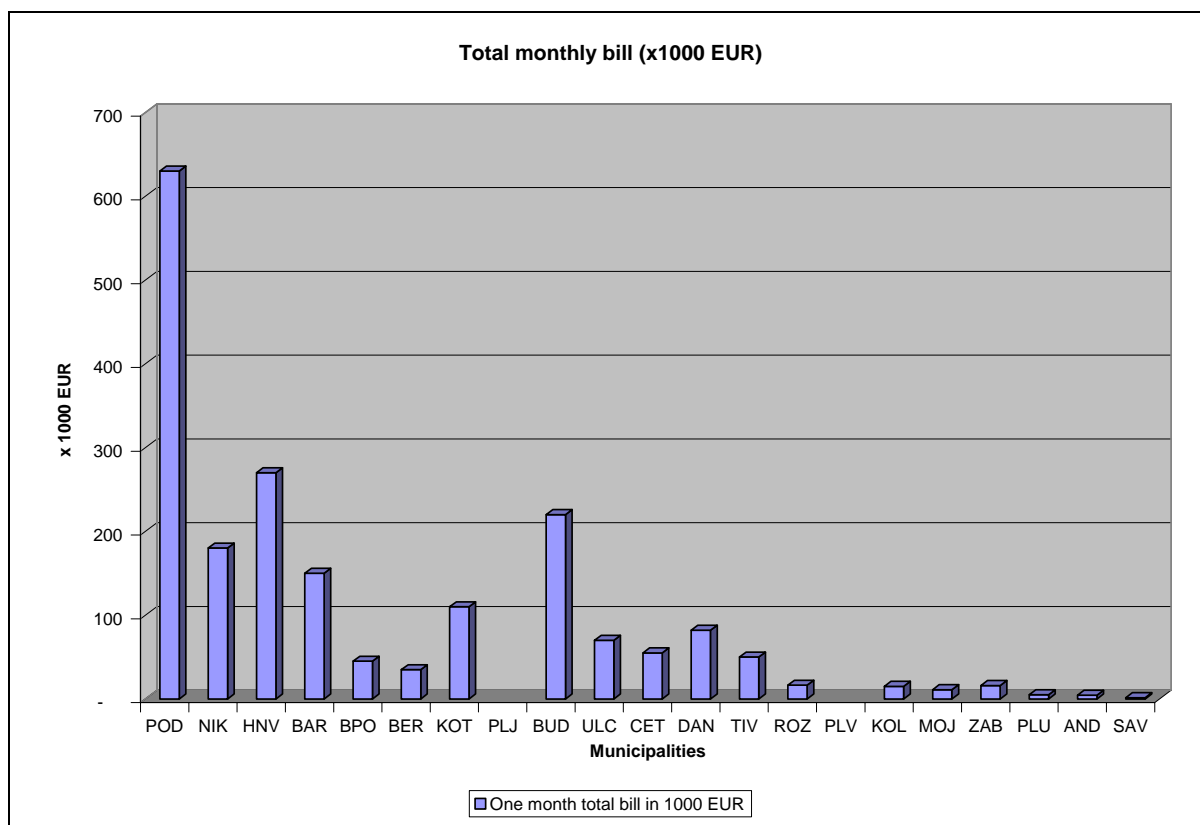


Diagram 5 – Total monthly bill (x1000 €)

There is some inconsistency in the monthly billing for water consumption from the various water works. For example, Podgorica's share in overall water production is 25%; but for potential monthly income from water consumption, Podgorica's share is 30% of the total.

Three water works (Podgorica, Herceg-Novi and Budva) have more than 50% of the potential water revenues for all of the water works in Montenegro.

The total monthly water consumption bills for Pluzine, Andrijevica and Šavnik is less than 5000 EUR/month combined.

19. *What is the experience, if any, in introducing modern management practices and implementation of low-cost technologies?*

The period of several years during which Montenegro was isolated from developed countries inevitably has affected the practice of managing waterworks companies.

While staff has received basic information on low-cost technologies (e.g., frequent pump regulation and maintenance), there has not been enough training to implement these changes.

Generally, the basic current philosophy of Montenegrin water works is survival and maintenance of its minimal water supply function.

20. *Is there any analysis, reports, or documentation prepared by independent international or local agencies regarding the work of your water works?*

In 2002, the auditing firm Deloitte & Touche performed a management audit of water works that were supposed to join Aquamundo (Herceg-Novi, Bar, Budva, Tivat, Kotor and Cetinje).

Louis Berger developed a business plan, financed by EAR, for the Water Works of Mojkovac.

No other assessments have been conducted, other than operations audits which are legally required by GoM for the larger water works.

21. In the last 2 years, has any staff attended training, workshops, or seminars presented by either local or international organizations? If yes, please specify in detail.

Six water works sent their staff to both local seminars and international fairs: Berane, Danilovgrad, Niksic, Podgorica, Ulcinj, and Bar.

5. ACCOUNTING SYSTEMS/BILLING AND COLLECTION PRACTICES

22. *How many people are employed in the accounting department?*

The response to this question varies depending on whether it was interpreted to include to meter readers and bill collectors, or only to water/sewerage works accounting staff. Also, the source of water works' collection problems depends on whom you ask: the reason for water works' poor collection rates is either inefficient collection techniques or poor water and sewerage accounting practices.

Employees can function in different capacities, depending on the practices of their particular water works. Duties can range from working strictly as a meter reader and bill collector; or performing that particular task for 3-4 days per month, while having other duties the remainder of the time.

Biling technology also varies. In several water works, billing is still performed manually on at the customer's place of residence or business from a book of records.

The number of accounting employees in five of the larger water works follows:

Podgorica – 50

Niksic – 39

Bijelo Polje – 8

Rozaje – 4

Danilovgrad – 10, though 7 of them also act as bill collectors/water meter readers

23. *Are customer connections equipped with water meters? If not, what system is used to calculate consumption? Briefly describe the system. Are water meters regularly calibrated? Estimate the number of non-functioning, unreplaced water meters within the distribution network. Please clarify and comment.*

This issue is detailed in the answer to question 12.

As previously mentioned, a general technical rule applied in all Montenegrin water works is that a new user **must** be connected to the network through a water meter. This rule is rarely strictly applied.

Influenced by difficult economic situations, an influx of refugees, and minimal living conditions for families (often in unfit buildings), Montenegrin water works, under pressure by their founders (local authorities), have generally ignored this technical obligation and have allowed legal connections to be made without the installation of water meters. Non metered connections have also been condoned for political reasons, especially in the last 10 years – non metered water connections can win votes in elections. Some municipalities have even approved (without prior agreement from the water works) the connection of entire villages, or sections of a town, to the distribution system without water meters. Water is used for political leverage; people are promised cheap (or even free) water if commit their votes to a particular candidate. The situation is worsening when politicians further circumvent the water works, by encouraging political supporters to connect illegally.

Many citizens who built houses without construction permits also choose to connect to water without meter installation. However, laws clearly forbid illegal connections for new construction. However, fines are small in comparison with those for stealing other utility

services. For example, stealing electricity, is regarded as a criminal act.

Different water works handle the billing of illegal (known) connections in different ways:

- Bills are issued to illegal customers as if their connection was a legal connection, though they are charged a flat rate (per person rate or areal rate) since actual consumption is unmetered.
- Customers are registered as illegal connections and billed a lump sum, with the bill clearly reading that the connection is illegal.
- The illegal connections are not billed because water works are not required to bill non-registered customers. Since it is technically illegal for water works to bill a non-registered customer without taking measures to register the connection, this approach is legally defensible but results in lost revenues.

At Montenegrin Water Works, billing is based on the quantity of consumed water, which is read from water meters, if they are operational. If the meter is non-existent or non-functioning, billing is calculated in one of three ways:

- number of persons per household
- square footage of the residence
- a flat set rate.

The sewer works fee is usually calculated as a percentage of the water bill; usually 50% of the overall water bill, though often without any explanation to the customer of the billing structure.

Some water works charge their customers additional miscellaneous fees such as: operational readiness, registration charges, or water meter maintenance fees, which could amount to several euro/m³/per month.

Passing water meter maintenance expenses on to the customer is not legal because water meter maintenance is the exclusive responsibility of the service provider – the water works.

In the last 10-15 years, water works have not been in the financial situation to pay for any projects that require cash payments; e.g., servicing and calibrating of water meters, servicing and repairing of pumps or generators.

Based on the answers provided by the water works, the majority of Montenegrin Water Works do not systematically service and calibrate water meters, and the number of poorly functioning water meters is increases every day. Lump sum readings and billings per household member are increasingly applied. Exceptions are the Water Works of Danilovgrad (700 jammed water meters were replaced last year), Tivat and Budva (regular calibrating, no jammed water meters), and Podgorica and Ulcinj (regular calibrating, but the number of water meters is insufficient for a 5-year cycle, so they are falling behind).

24. Is the whole or part of the water works computerized? Please specify which parts are computerized and the software used.

Seventy-one percent of water works in Montenegro have at least one computer used primarily for accounting and billing. All software operates in DOS.

Water works without computers (29%) are the following: Andrejevica, Berane, Mojkovac, Pluzine, Plav and Šavnik. Their customers are billed manually, in the field, through record books.

25. Please describe the actual calculation system for water and sewerage rates in your company. Please comment.

Long-time water works employees recall that previously they performed analyses of water and sewerage rates and had to prove the calculation costs if a new (increased) water tariff was to be approved by the water works management board and the Mayor.

Unfortunately, during the last several tariff increases, an analysis was never requested, even as a starting point in the decision-making process. It was more likely that the percentage of the increase reflected the »feeling« of the Mayor that the increase was not too much and would not influence his political rating in the municipality.

There are no formal methods of evaluating the effectiveness of tariff increases, although in some water works designated employees may monitor its impact as part of their job.

26. Please describe the tariff system for consumed water, sewerage discharge, and other fees used in your company. Please attach the present price list. Are you satisfied with the tariff system? If not, which tariff-price system would be preferred?

The tariff system is the same in all water works, with no variations. All water works recognize two categories of customers: residential and commercial properties (known as legal entities). Each category has a different pricing level. Although the percentage of commercial to residential usage varies from one municipality to another, the average commercial consumption is approximately 40% of the total water consumption.

Each water works pays a 3% fee to the Ministry of Agriculture, Forestry and Water Economy, which is built into the total tariff.

Extreme and average tariff charged by Montenegrin water works:

Residential, maximum in Cetinje – 0.78 EUR/ m³

Residential, minimum in Mojkovac – 0.11 EUR/ m³

Residential average – 0.37 EUR/ m³

Commercial, maximum in Cetinje – 3.17 EUR/ m³

Commercial, minimum in Šavnik – 0.25 EUR/ m³

Commercial average – 1.07 EUR/ m³

Diagram 6 shows a graphic review of water prices at the time of this Report:

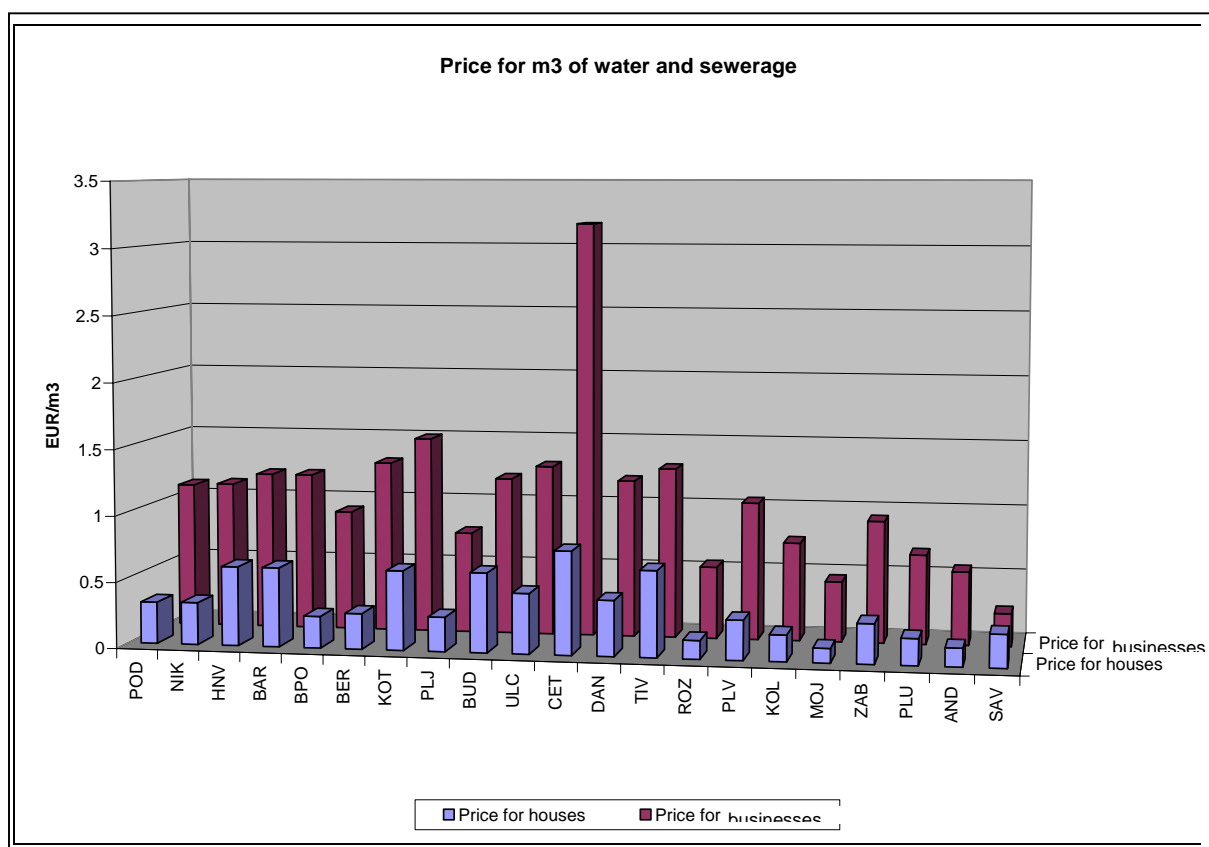


Diagram 6 – Price per m³ of water and sewerage charged by Montenegrin Water Works

Overall, a higher than average price (0.4 EUR/ m³) is seen in coastal municipalities (0.6 EUR/ m³); while Danilovgrad stands out with a slightly higher than average pricing among the inland municipalities.

Pricing in the business sector (except for the extreme case in Cetinje) is consistent in the larger municipalities, with a variation of approximately 1 EUR/ m³; while pricing in the smaller municipalities varies approximately 0.5 EUR/ m³.

Assuming a residential/commercial consumption ratio is 60% to 40% in all the municipalities, an average pricing in each water works can be calculated as 0.65 EUR/ m³ (as shown in Diagram 6).

The coastal Water Works including Danilovgrad and Cetinje, have an average price of 0.8 EUR/ m³.

The remaining water works (including both large and small systems) have an average price varying between 0.4 and 0.6 EUR/ m³.

Four water works (Rozaje, Mojkovac, Andrijevica, and Šavnik) have a very low average price of about 0.2 EUR/ m³. In small systems such as these, low pricing has serious consequences on the work and operations of a water works.

Even though during the initial collection of data, all the water supply enterprises complained of low revenue levels, the general opinion is that any potential for future price increases has been exhausted. It is also generally believed that even if prices did increase, total income to the water works would remain constant because the number of delinquent customers would increase.

If a lower value is adopted based on ability to pay (in European countries 3 – 5% of the total family budget is spent on water and sewerage costs), and the following assumptions are calculated:

Considering a family of 4, with 1 member employed and earning a net salary of 250 EUR (slightly above average) with an average water consumption of 5 m³/per member/month.

The customer could afford to pay:

At the lower percentage of 3% of salary = $(3\% \times 250 \text{ EUR}) / (4 \times 5 \text{ m}^3) = 0.4 \text{ EUR/ m}^3$

In case of the upper limit of 5% of salary = 0.6 EUR/ m³

The opinion of the water works managers is consistent with the criteria cited in professional literature. However, most water works would not need a tariff increase if all customers actually paid for the water they consume.

27. Please describe any experiences with recent increases in pricing/changing of the tariff system. What were the main problems and how were they overcome?

This question has already been addressed in the answers to previous questions. There were no unexpected answers.

28. Which method of sending bills to customers is used (e.g., by post, by courier, at the water works) and what is the frequency of billing and collection? How much money (% of value of total issued bills) was collected from consumers during the first and second month?

In most water works, monthly bills (based on the previous month's usage) are usually issued to residential customers by bill collectors, who go door-to-door. The bill is left for those customers who are not at home, or who will not pay at the time of the visit.

Bills can be paid at several locations: to the cashier at the water works, at the Post Office, or, in larger municipalities, various points around the city. It is also possible to pay the bill through the bank, but this method is not generally used because of the bank's service fee.

Commercial billings are done monthly through the mail. Businesses without a commercial address receive bills through the bill collectors, like residential customers. Commercial enterprises pay exclusively through bank transfers.

The rate of bill collection is not monitored during the first month, even though accurate records are kept. However, it is estimated that 10-30% is collected during the first month.

Most retired people pay their bill immediately after receiving their pension. This group is the most reliable in their payments.

29. In case of existing subsidies, in which way are subsidized customers financed? Please comment.

In principle, there is no such thing as legal or systematic public assistance for water bills. However, in some water works, consumption assistance exists for handicapped persons, socially endangered persons, refugees, etc. The scope of this public assistance is small.

There are no systematic subsidies in case of business entities. Water used by communal enterprises (street washing) or fire departments are neither metered nor billed.

Podgorica has a special pricing category (priced between residential and commercial rates) for government buildings, whose water bills are paid from local and republic budgets.

30. What quantity of water was produced (including water purchased from other water supply enterprises) in 2000? in 2001 (m³/year)? How is the produced water measured/estimated?

31. What quantity of water was sold in 2000? In 2001? (m³/year)?

Because most water works do not have flow meters at water sources and water meters are in poor condition, data can only be generally analyzed from 8 water supply enterprises. The analysis is shown graphically in Diagrams 7 and 8:

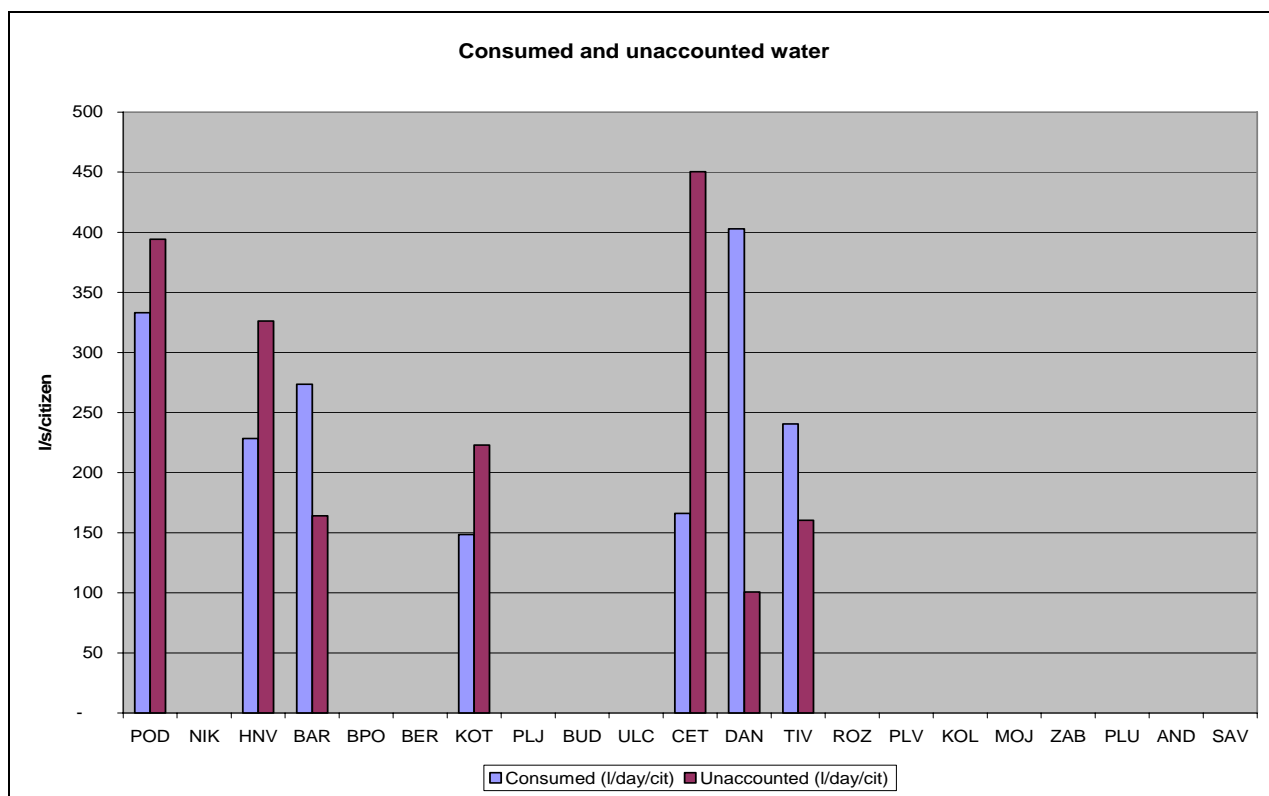


Diagram 7 – Consumed (billed) and unaccounted for water

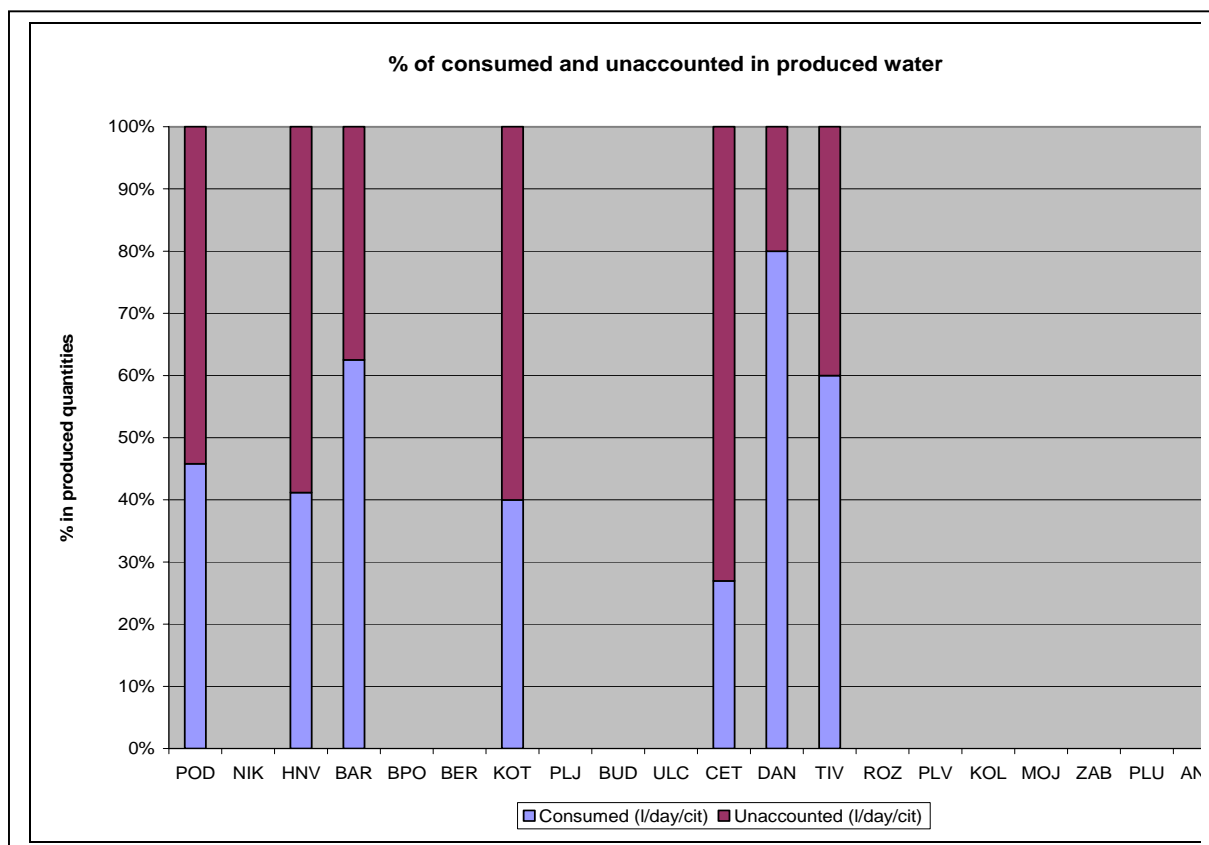


Diagram 8 – Percentage of consumed (billed) and unaccounted for water

In Diagram 7, except for Podgorica and Danilovgrad, all data are from water works located in tourist areas (even though the local population is much greater than the number of tourists). Average consumption data (l/municipality/day) are inaccurate because tourist usage is also included in the data.

Diagram 8 indicates that only in Danilovgrad, Bar and Tivat the billed quantity of water exceeds the unbilled quantity. These three water works are among the most advanced (technologically speaking) water works in Montenegro

Since Diagram 8 is based on data from water works able to provide information on total amount of water sold, it's likely that the situation is actually worse in the other water supply systems.

32. Give an estimate of the amount of unaccounted for water and the principal cause for the losses. Are there any leak detection methods?

The average unaccounted for water is estimated at 30-40%. However, this figure is only an educated guess, because Podgorica is the only water works in Montenegro to have leakage detection equipment.

33. Does the water works have any enforcement mechanisms (e.g., fines for illegal connections, termination of service for non-payment)? Please describe legal framework and real effects in case of applied enforcement.

The legal framework in Montenegro is as follows:

A water supply enterprise, in terms of law, is authorized to disconnect either a legal or physical entity that does not pay for the consumed water. If requested by the customer, the Court can order temporary reconnection due to alleged »property right violation«.

A physical entity is not required to pay any bills older than one year, unless previously sued for nonpayment of those bills by the water supply company.

Any sued customer can submit an objection (even without presenting an argument; in spite of the indisputable fact of his debt), which initiates a civil suit, thus considerably extending the legal procedure.

Water supply enterprises would probably lose any civil suit in which a customer proves that his water meter, on which his unpaid billing was based, is not calibrated

Because Montenegrin courts are overloaded, only occasionally do these lawsuits become a priority to be heard.

Even if the customer loses and a sentence is pronounced, the executive court procedure is slow. If the customer is unemployed and does not receive a pension, an auction of household items is held. This is usually not a satisfactory resolution, as the general population is reluctant to purchase, even very cheaply, items that are sold at the direction of the court. The only sentence that is effective is a direct deduction from salary or pension.

Water works do apply disconnection and lawsuits to collect past due billings. Their experiences differ and depend on numerous factors. Local municipal authorities are often of the belief that there should not be any enforcement measures, and even intervene to prevent their application.

34. If possible, report revenues as a % of operating and maintenance (O&M) costs.

The water works were unable to answer this question as their practices do not accurately track O&M costs incurred.

6. PUBLIC INVOLVEMENT

35. *Has the public been involved in any recent water rates settings? How were they involved?*

Not at any water works.

36. *What is the visible or appreciable impact on better management/improving of practice in your water works of USAID financed projects CRDA and MISF?*

There was no visible or appreciable influence on improvement of management/existing practice in water works.

37. *Have any public surveys or focus groups been conducted during the last 3 years (e.g., testing for service quality, willingness to pay for full cost of service delivery)?*

Not at any water works.

38. *Are you aware of any general policy issues of interest to the public (e.g., service quality, tariffs, enforcement)? Are there key local counterparts in charge of these issues? Who?*

During the survey, this question was rephrased: *who does the public call first, the Mayor or the Water Works Director, for incidents in water delivery? Who is generally blamed for dissatisfaction for poor municipal service (e.g., product, extended damage repair time, usual or unusual water shortage)?*

The answer was always the Director of the water works, except in cases of recent appointees who were insufficiently known to the public.

According to public opinion, local authorities and the water works operate independently of each other. The water works also sees itself as a secure, self-sustained utility, much as the electrical industry or the telephone company. The inter-relationship and responsibilities of both the local government and the water works towards each other is often unrecognized. That relationship has is commonly minimized by municipal authorities. For example, municipal authorities often request that water works explain to the Public why they have not expanded their systems – extending the distribution network towards new construction, in spite of the fact that local authorities were the ones who collected communal charges from these citizens to finance network expansion without consulting with the water works if the promised expansion is practical or necessary.

39. *Is there any serious discussion on private concessions in larger cities for water or other communal services?*

Not in any water works, except for Tivat (positive) and Herceg-Novi (negative) experience.

40. *Are there certain issues of water works management that appear generic and could lend themselves to integrated training/TA delivered jointly to management of different types of communal enterprises (water, wastewater, garbage)? Please specify.*

No water works identified any areas in common.